iSBC 660™
SYSTEM CHASSIS
HARDWARE REFERENCE MANUAL

Manual Order Number: 9800505-04

intel®

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Intel Corporation, 3065 Bowers Avenue, Santa Clara, California 95051

REV.	REVISION HISTORY	DATE
-01	Original Issue	8/77
-02	New Power Supply Information; New Multibus Signals (Table 2-1 and 2-4); Revised Service Procedures (Chapter 4).	7-79
-03	Revised Priority Scheme Artwork (Section 2-9); New "Service Assistance" data (Section 4-2); Revised Schematics.	5-80
-04	Revised Connector Part Numbers (Table 2-3)	10-80

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A438/981/3K FL

PREFACE

This manual provides general information, installation instructions, principles of operation, and service information for the iSBC 660 System Chassis. Additional information is available in the following documents:

- *Intel iSBC 640 Power Supply Hardware Reference Manual,* Order No. 9800803.
- *Intel iSBC 604/614 Cardcage Hardware Reference Manual,* Order No. 9800708.
- *Intel Multibus Specification,* Order No. 9800683.

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CHAPTER 1
GENERAL INFORMATION

1-1. INTRODUCTION

The iSBC 660 System Chassis (figure 1-1) is packaged as a completely assembled microcomputer chassis. It consists of a power supply, two four-slot cardcage/backplane assemblies, dual fans, and a front panel. This chapter provides a general description of the chassis in addition to a specifications table.

1-2. CHASSIS DESCRIPTION

The iSBC 660 System Chassis is designed to be rack mounted, using RETMA compatible components. The 19-inch front panel has a power ON/OFF indicator switch and a RESET switch. The rear panel is easily removed for quick access to the cardcages.

The two cooling fans are located on the left side of the chassis, one directed toward the power supply and the other directed toward the cardcages. These fans supply adequate ventilation to keep the fully loaded chassis within temperature tolerance.

An iSBC 614 Cardcage/Backplane assembly is stacked onto an iSBC 604 Cardcage/Backplane assembly. This configuration accepts up to eight iSBC compatible boards.

Output power is furnished by the modular iSBC 640 Power Supply. The supply is mounted directly behind the front panel and is easily removed or calibrated. Accepting either 100, 115, 215, or 230 Vac, the supply provides fully regulated and protected +12, +15, -12 and -5 volt outputs. A power line monitor signal is also provided for use with power-down subroutines.

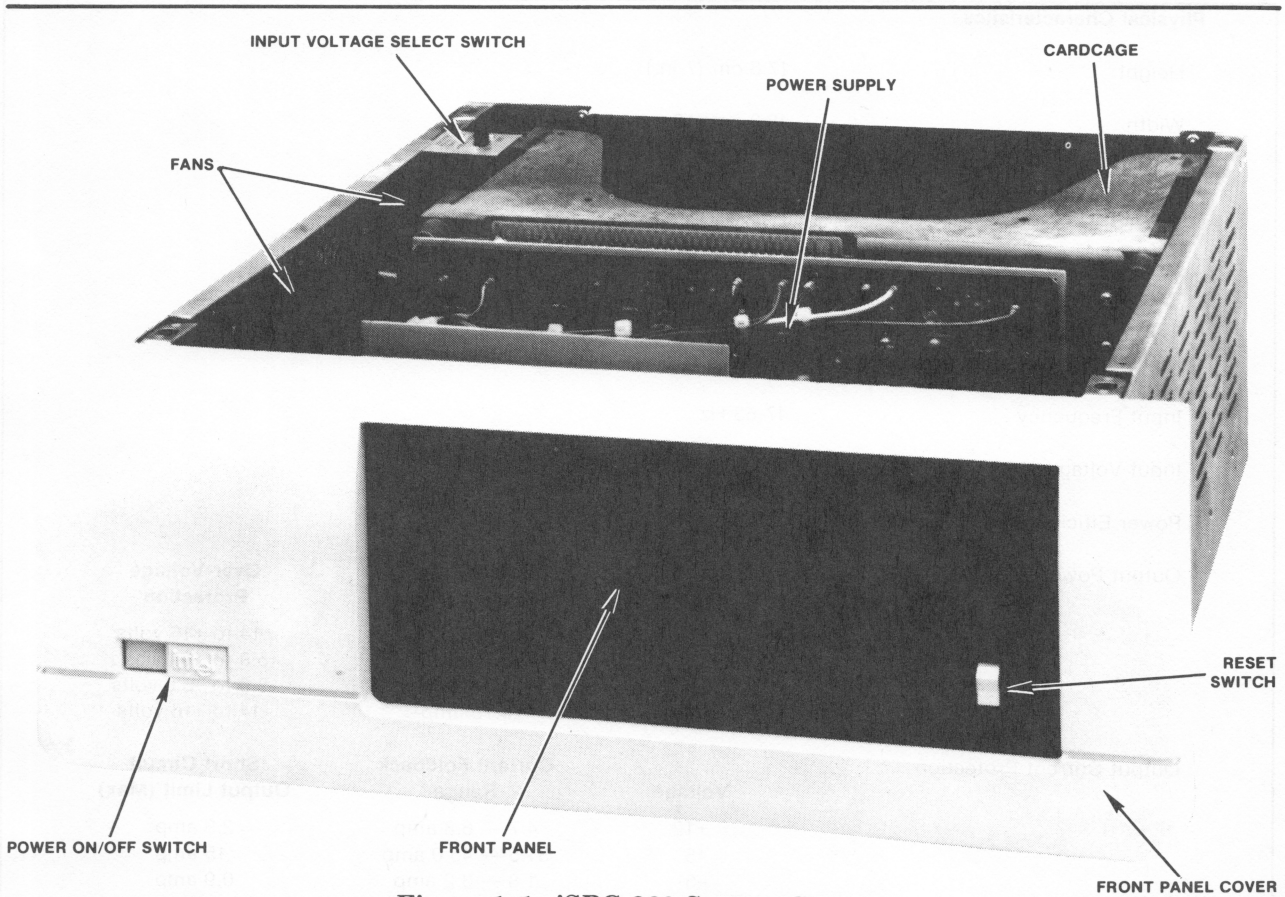


Figure 1-1. iSBC 660 System Chassis

1-3. DOCUMENTATION SUPPLIED

The following Hardware Reference Manuals are supplied with the iSBC 660 System Chassis:

1. *iSBC 660 System Chassis Hardware Reference Manual* Order Number 9800505.
2. *iSBC 640 Power Supply Hardware Reference Manual* Order Number 9800803.

A chassis wiring diagram, front panel logic diagram, and replacement parts listing are located in Chapter 4 of this manual. Similar diagrams and parts listings pertaining to the power supply is located in the "Service Information" chapter of the other manual.

1-4. EQUIPMENT SUPPLIED

The following equipment is supplied with the iSBC 660 System Chassis: front panel with switches and indicators, two fans, power supply, cardcage/backplane, fuse, line filter and a 115 Vac power cord.

1-5. USER SUPPLIED EQUIPMENT

All rack mounting hardware is user supplied. Chapter 2 describes procedures for mounting and lists recommended parts. If the chassis is optioned for 230 volt operation, the power cord is not supplied. Any I/O cables are also user furnished. The hardware reference manual for each iSBC board will provide a table of compatible I/O connectors recommended by Intel (not all boards require I/O cables, however).

1-6. SPECIFICATIONS

Specifications of the iSBC 660 System Chassis are listed in table 1-1.

Table 1-1. Specifications

Physical Characteristics

Height	17.8 cm (7 in.)
Width	48.3 cm (19 in.) at front panel 43.2 cm (17 in.) behind front panel
Depth	50.8 cm (20 in.) with all protrusions
Weight	20.9 Kg (46 pounds)

Power Supply Electrical Characteristics

Input Frequency	47-63 Hz
Input Voltage	100, 115, 215, or 230 Vac ±10%
Power Efficiency	35% Minimum

Output Power Rating

Nominal Voltage	Rated Output Current (Max)	Over-Voltage Protection
+12	4.5 amp	+14 to +16 volts
+5	30.0 amp	+5.8 to +6.6 volts
-5	1.75 amp	-5.8 to -6.6 volts
-12	1.75 amp	-14 to -16 volts

Output Current Protection

Voltage	Current Foldback Range	Short Circuit Output Limit (Max)
+12	4.7 — 6.8 amp	2.3 amp
+5	31.5 — 45.0 amp	15 amp
-5	1.8 — 3.2 amp	0.9 amp
-12	1.8 — 3.2 amp	0.9 amp

Table 1-1. Specifications (Continued)

Environmental Characteristics	
Operating Temperature	0° to 50°C (32° to 122°F) with 55 CFM air
Heat Dissipation (Maximum)	9.52 kcal./min. (38.55 Btu/min.)
Non-operating Temperature	-40° to 85°C (-40° to 185°F)
Humidity	Up to 90%, non-condensing
Stability	±0.5% for eight hours after 30 min. warmup
Temperature Coefficient	±0.03% per degree centigrade maximum

CHAPTER 2
PREPARATION FOR USE

2-1. INTRODUCTION

This chapter provides instructions for unpacking, installation and initial setup of the iSBC 660 System Chassis. The user should be thoroughly familiar with the contents of this chapter before applying power to the chassis.

2-2. UNPACKING AND INSPECTION

Inspect the shipping carton immediately upon receipt for evidence of mishandling during transit. If the shipping carton is severely damaged or waterstained, request that the carrier's agent be present when the carton is opened. If the carrier's agent is not present when the carton is opened and the contents of the carton are damaged, keep the carton and packing material for the agent's inspection.

For repairs to a product damaged in shipment, contact the Intel Product Service Hotline (see paragraph 4-2) to obtain a Return Authorization Number and further instructions. A purchase order will be required to complete the repair. A copy of the purchase order should be submitted to the carrier with your claim.

It is suggested that salvageable shipping cartons and packing material be saved for future use in the event the product must be shipped.

2-3. INSTALLATION CONSIDERATIONS

The iSBC 660 System Chassis is designed for 19 inch RETMA rack mounting. Figure 2-1 illustrates all relevant outline dimensions. Before chassis installation, the user should be familiar with paragraphs 2-4 through 2-8.

2-4. POWER REQUIREMENTS

The chassis is equipped with the iSBC 640 Power Supply. This power supply requires one of the following four AC input voltages: 100, 115, 215, or 230, all ±10%. Frequency range of the power supply is 47 to 63 Hz. The chassis is shipped in the 115 volt configuration. Instructions for converting the power supply to one of the other voltages are given in the *iSBC 640 Power Supply Hardware Reference Manual* (Order No. 9800803). The power supply is designed to handle up to eight fully loaded iSBC boards. Refer to the above mentioned manual for complete specifications.

2-5. COOLING REQUIREMENTS

The chassis, with expansion boards dissipates about 9.52 kilogram calories of heat per minute following warmup. Adequate cooling (maintain temperature below 50°C) for the chassis and eight iSBC boards is provided by the two chassis fans. Care should be exercised during installation to prevent obstruction of chassis air flow openings.

2-6. RACK MOUNTING

The iSBC 660 System Chassis is designed for rack mounting in a standard 19-inch RETMA rack using either pivoting or non-pivoting slides. Recommended slides are Chassis-Trak C-300-S-122 (non-pivoting) or C-300-D-122 (pivoting) with alternate T-bar, handle with internal detent release.

NOTE

When using slide mounts other than Chassis-Trak, ensure they do not obstruct the fan cutout more than 1.9 cm (0.75 inch) from the bottom edge of the cutout.

Since all iSBC boards are installed through the rear panel, pivoting slides are recommended. To rack mount the iSBC 660 System Chassis proceed as follows:

WARNING

Hazardous voltages are exposed when the top cover is removed with ac power applied. Disconnect the ac power cord before proceeding beyond this point.

a. Remove top cover and partially remove power supply as described in paragraph 4-4.

b. When installing non-pivoting slides, remove cardcage and backplane assembly. (Refer to paragraph 4-5.)

c. Mount slides on chassis using mounting hardware supplied with slides.

NOTE

Use the front three holes for securing pivot type slides; use the second, fourth, and sixth holes for securing non-pivoting slides. (Refer to figure 2-1).

d. When mounting slides other than Chassis-Trak, drill holes according to the manufacturer's instructions.

CAUTION

When drilling new holes, ensure that all metal filings and chips are removed from the interior of the chassis before applying power. Failure to comply may result in damage to the equipment.

e. After the iSBC 660 System Chassis has been mounted in the cabinet, secure it in place with four No. 10-32 roundhead machine screws attached through the front of the chassis.

2-7. PHYSICAL DIMENSIONS

The physical dimensions of the iSBC 660 System Chassis are shown in figure 2-1.

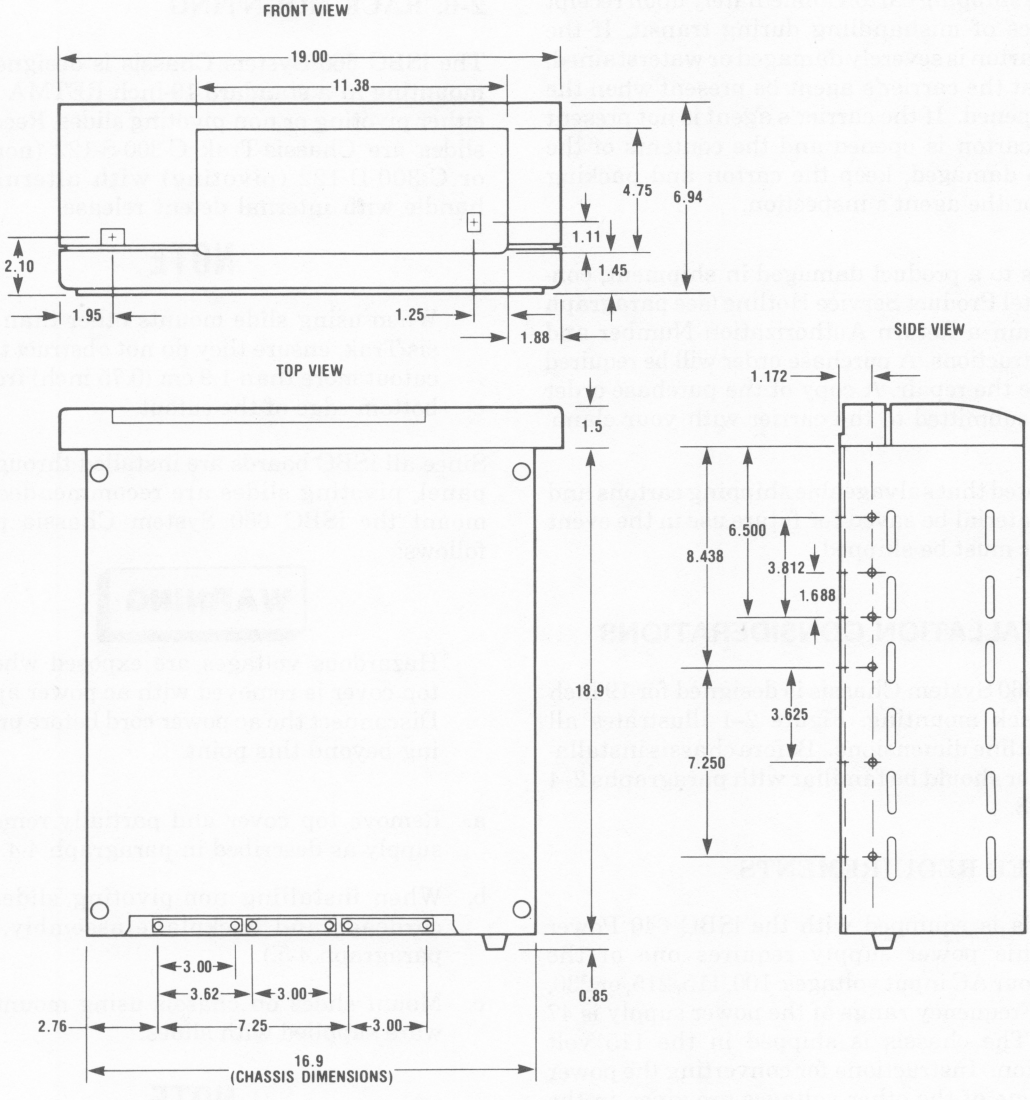


Figure 2-1. iSBC 660 Physical Dimensions (Inches)

2-8. MULTIBUS LINES DESCRIPTION

The iSBC 660 System Chassis is equipped with the iSBC 604 and iSBC 614 Cardcage/Backplanes. The backplane conforms to the Intel Multibus specification. These signals and pin numbers are referenced in table 2-1. Some Intel Single Board Computers use connector P2 for additional signals and battery backup. These assignments are listed in table 2-2.

2-9. MULTIBUS LINES PRIORITY

The iSBC 660 System Chassis can be used with master boards in either a serial or parallel priority scheme. A master board is defined as a board which is capable of acquiring and controlling Multibus lines. One of the two priority methods must be implemented, or the boards in the cardcage will not interact.

In the serial method, priority is resolved by board placement. Slot J2 (top slot) has the highest priority and J5 the lowest. To implement this method, a jumper must be installed between wire wrap posts B and L on the etch side of the top backplane. This is illustrated in figure 2-2. In this scheme a maximum of three master boards may be used.

To initiate a parallel priority scheme, a priority resolver network is required. Boards such as the iSBC 80/20 and 80/30 Single Board Computers may use this network. A typical hookup of this type is shown in figure 2-3.

Additional Multibus information may be obtained from the *Multibus Specification,* Order Number 9800683.

2-10. MULTIBUS LINES AND AUXILIARY CONNECTORS

Recommended compatible bus connectors for P1 and P2 are listed in table 2-3.

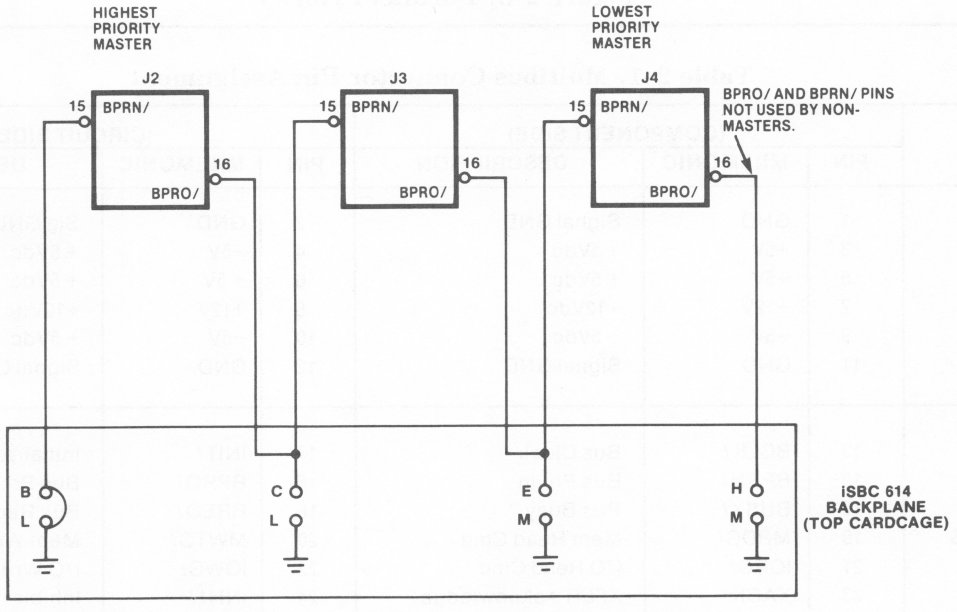


Figure 2-2. Serial Priority

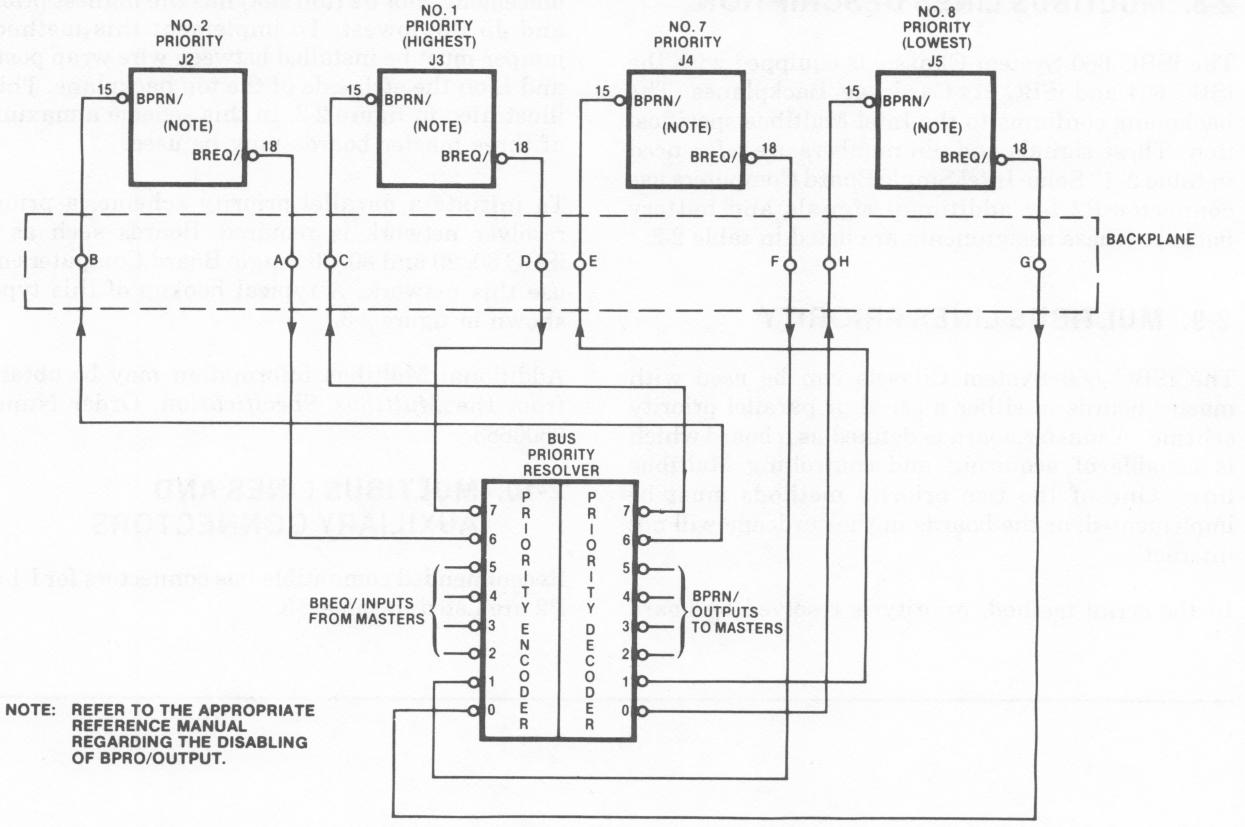


Figure 2-3. Parallel Priority

Table 2-1. Multibus Connector Pin Assignment

	(COMPONENT SIDE)			(CIRCUIT SIDE)		
	PIN	MNEMONIC	DESCRIPTION	PIN	MNEMONIC	DESCRIPTION
POWER SUPPLIES	1	GND	Signal GND	2	GND	Sig GND
	3	+5V	+ 5Vdc	4	+5V	+ 5Vdc
	5	+5V	+ 5Vdc	6	+ 5V	+ 5Vdc
	7	+12V	+12Vdc	8	+12V	+12Vdc
	9	−5V	− 5Vdc	10	−5V	− 5Vdc
	11	GND	Signal GND	12	GND	Signal GND
BUS CONTROLS	13	BCLK/	Bus Clock	14	INIT/	Initialize
	15	BPRN/	Bus Pri. In	16	BPRO/	Bus Pri. Out
	17	BUSY/	Bus Busy	18	BREQ/	Bus Request
	19	MRDC/	Mem Read Cmd	20	MWTC/	Mem Write Cmd
	21	IORC/	I/O Read Cmd	22	IOWC/	I/O Write Cmd
	23	XACK/	XFER Acknowledge	24	INH1/	Inhibit 1 disable RAM
	25	AACK/	Advance Acknowledge	26	INH2/	Inhibit 2 disable ROM
	27	BHEN/	Byte High Enable	28	ADR10/	
	29	CBRQ/	Common Bus Request	30	ADR11/	Address
	31	CCLK/	Constant Clk	32	ADR12/	Bus
	33	INTA/	Intr Acknowledge	34	ADR13/	

Table 2-1. Multibus Connector Pin Assignment (Continued)

	(COMPONENT SIDE)			(CIRCUIT SIDE)		
	PIN	MNEMONIC	DESCRIPTION	PIN	MNEMONIC	DESCRIPTION
INTERRUPTS	35	INT6/	Parallel	36	INT7/	Parallel
	37	INT4/	Interrupt	38	INT5/	Interrupt
	39	INT2/	Requests	40	INT3/	Requests
	41	INT0/		42	INT1/	
ADDRESS	43	ADRE/		44	ADRF/	
	45	ADRC/		46	ADRD/	
	47	ADRA/	Address	48	ADRB	Address
	49	ADR8/	Bus	50	ADR9/	Bus
	51	ADR6/		52	ADR7/	
	53	ADR4/		54	ADR5/	
	55	ADR2/		56	ADR3/	
	57	ADR0/[1]		58	ADR1/	
DATA	59	DATE/		60	DATF/	
	61	DATC/		62	DATD/	
	63	DATA/	Data	64	DATB/	Data
	65	DAT8/	Bus	66	DAT9/	Bus
	67	DAT6/		68	DAT7/	
	69	DAT4/		70	DAT5/	
	71	DAT2/		72	DAT3/	
	73	DAT0/		74	DAT1/	
POWER SUPPLIES	75	GND	Signal GND	76	GND	Signal GND
	77	−10V[2]	−10Vdc	78	−10V[2]	−10Vdc
	79	−12V	−12Vdc	80	−12V	−12Vdc
	81	+5V	+ 5Vdc	82	+5V	+ 5Vdc
	83	+5V	+ 5Vdc	84	+5V	+ 5Vdc
	85	GND	Signal GND	86	GND	Signal GND

Notes:
1. ADR0/ is equivalent to BLEN (positive true) when used on 16 bit systems.
2. Not used on MULTIBUS connector.

Table 2-2. Auxiliary Connector Pin Assignment

(COMPONENT SIDE)		(CIRCUIT SIDE)			
PIN	MNEMONIC	DESCRIPTION	PIN	MNEMONIC	DESCRIPTION
1	GND	Signal GND	2	GND	Signal GND
3	5VB	+5V Battery	4	5VB	+ 5V Battery
5			6	VCCPP	+ 5V Pulsed Power
7	-5VB	-5V Battery	8	-5VB	− 5V Battery
9			10	Reserved	
11	12VB	+12V Battery	12	12VB	+12V Battery
13	PFSR/	Power Fail Sense Reset	14	Reserved	
15	-12VB	-12V Battery	16	-12VB	−12V Battery
17	PFSN/	Power Fail Sense	18	ACLO	AC LOW

Table 2-2. Auxiliary Connector Pin Assignment (Continued)

(COMPONENT SIDE) PIN	MNEMONIC	(CIRCUIT SIDE) DESCRIPTION	PIN	MNEMONIC	DESCRIPTION
19	PFIN/	Power Fail Interrupt	20	MPRO/	Memory Protect
21	GND	Signal GND	22	GND	Signal GND
23	+15V	+15V	24	+15V	+15V
25	−15V	−15V	26	−15V	−15V
27	PAR1/	Parity 1	28	HALT/	Bus Master HALT
29	PAR2/	Parity 2	30	WAIT/	Bus Master WAIT STATE
31	↑		32	ALE	Bus Master ALE
33			34	Reserved	
35			36	Reserved	
37			38	AUX RESET/	Reset switch
39			40	↑	
41	Reserved		42		
43	↓		44		
45			46	Reserved	
47			48	↓	
49			50		
51			52		
53			54		
55			56		
57			58		
59			60		

Notes:
1. If possible, on slave boards, PFIN should be connected to INT0/.
2. All undefined pins are reserved for future use.

Table 2-3. User-Furnished Connector Details

Function	No. of Pairs/ Pins	Centers (Inches)	Connector Type	Vendor	Vendor Part No.	Intel Part No.
Multibus Connector (P1)	43/86	0.156	Soldered [1] PCB Mount	Elfab Viking	BS1562043PBB 2KH43/9AMK12	102247-001
Multibus Connector (P1)	43/86	0.156	Wire Wrap [1,2] No Ears	Edac Elfab	337-086-0540-201 BW1562D43PBB	102248-001
Auxiliary Connector (P2)	30/60	0.1	Wire Wrap [1,2]	Edac Elfab	345-060-524-802 BS1020A30PBB	102238-001
Auxiliary Connector (P2)	30/60	0.1	Wire Wrap [1,2] No Ears	Edac Elfab	345-060-540-201 BW1020D30PBB	102241-001

NOTES:
1. Connector heights are not guaranteed to conform to OEM packaging equipment.
2. Wire wrap pin lengths are not guaranteed to conform to OEM packaging equipment.

Table 2-4. Multibus Connector Signal Definitions

SIGNAL	FUNCTIONAL DESCRIPTION
ADR0/-ADR13/	*Address.* These 20 lines transmit the address of the memory location or I/O port to be accessed. For memory access, ADR0/ (when active) enables the even byte bank (DAT0/-DAT7/) on the Multibus data lines; i.e., ADR0/ is active for all even addresses. ADR13 is the most significant address bit.
BCLK/	*Bus Clock.* Used to synchronize the bus contention logic on all bus masters.
BHEN/	*Byte High Enable.* When active low, enables the odd byte bank (DAT8/-DATF/) onto the Multibus data lines.
BPRN/	*Bus Priority In.* When low indicates to a particular bus master that no higher priority bus master is requesting use of the bus. BPRN/ is synchronized with BCLK/.
BPRO/	*Bus Priority Out.* In serial (daisy chain) priority resolution schemes, BPRO/ must be connected to the BPRN/ input of the bus master with the next lower bus priority.
BREQ/	*Bus Request.* In parallel priority resolution schemes, BREQ/ indicates that a particular bus master requires control of the bus for one or more data transfers. BREQ/ is synchronized with BCLK/.
BUSY/	*Bus Busy.* Indicates that the bus is in use and prevents all other bus masters from gaining control of the bus. BUSY/ is synchronized with BCLK/.
CBRQ/	*Common Bus Request.* Indicates that a bus master wishes control of the bus but does not presently have control. As soon as control of the bus is obtained, the requesting bus controller raises the CBRQ/ signal.
CCLK/	*Constant Clock.* Provides a clock signal of constant frequency for use by other system modules.
DAT0/-DATF/	*Data.* These 16 bidirectional data lines transmit and receive data to and from the addressed memory location or I/O port. DATF/ is the most-significant bit. For data byte operations, DAT0/-DAT7/ is the even byte and DAT8/-DATF/ is the odd byte.
INH1/	*Inhibit RAM.* For system applications, allows iSBC dual port RAM addresses to be overlayed by ROM/PROM or memory mapped I/O devices. [This signal has no effect on CPU access of its on-board RAM.
INH2/	*Inhibit ROM.* For system applications, allows ROM/PROM addresses to be overlayed by auxiliary ROM devices (e.g., a bootstrap program).
INIT/	*Initialize.* Reset the entire system to a known internal state.
INTA/	*Interrupt Acknowledge.* This signal is issued in response to an interrupt request.
INT0/-INT7/	*Interrupt Request.* These eight lines transmit interrupt requests to the appropriate interrupt handler. INT0/ has the highest priority.
IORC/	*I/O Read Command.* Indicates that the address of an I/O port is on the Multibus address lines and that the output of that port is to be read (placed) onto the Multibus Data lines.
IOWC/	*I/O Write Command.* Indicates that the address of an I/O port is on the Multibus address lines and that the contents on the Multibus data lines are to be accepted by the addressed port.
MRDC/	*Memory Read Command.* Indicates that the address of a memory location is on the Multibus address lines and that the contents of that location are to be read (placed) on the Multibus data lines.
MWTC/	*Memory Write Command.* Indicates that the address of a memory location is on the Multibus address lines and that the contents on the Multibus data lines are to be written into that location.
XACK/	*Transfer Acknowledge.* Indicates that the addressed memory location has completed the specified read or write operation. That is, data has been placed onto or accepted from the Multibus data lines.

Table 2-5. Auxiliary Connector Signal Definitions

SIGNAL	FUNCTIONAL DESCRIPTION
ACLO	*AC Low.* Indicates a loss of AC voltage.
ALE	*Address Latch Enable.* Generated by CPU to provide auxiliary address latch.
HALT/	*Halt.* Indicates that the master CPU is halted.
MPRO/	*Memory Protect.* This externally generated signal prevents access to the dual port RAM during battery backup operation.
PFIN/	*Power Fail Interrupt.* This signal from the power supply can be used to interrupt the processor when a power failure occurs.
PFSN/	*Power Fail Sense.* Provides a latch for power failure event.
PFSR/	*Power Fail Reset.* Used to reset power fail sense latch.
PUPO/	*Pulsed Power Off.*
RESET/	*Reset.* This externally generated signal can be used to initiate a power-up sequence.
WAIT/	*Bus Master Wait State.* This signal indicates that the processor is in a wait state.

CHAPTER 3
PRINCIPLES OF OPERATION

3-1. INTRODUCTION

This chapter describes the basic functional operation of the iSBC 660 System Chassis. Most of the information in this chapter centers around the operation of the front panel. Discussion of the power supply is covered in a separate publication, the *iSBC 640 Power Supply Hardware Reference Manual,* Order Number 9800803.

3-2. FUNCTIONAL DESCRIPTION

The chassis functional components include the front panel with switches, two cooling fans, power supply, two four-slot cardcage/backplanes and a domestic (115 volt) power cord. The following paragraphs describe the major components of the chassis.

3-3. FRONT PANEL SWITCHES AND INDICATORS

Two switches reside on the iSBC 660 front panel: the power ON/OFF indicator/switch, and the RESET switch.

The power ON/OFF indicator/switch (S1) is located on the left side of the front panel. When power is applied, the indicator will illuminate.

The RESET switch (S3) is a momentary rocker type. It is wired to pin 14 of the backplane. When depressed, the switch generates the RESET/ signal, which is synonymous with INIT/ on the backplane. The flip-flop which actually generates RESET/ is located on the front panel printed circuit board, figure 4-5.

3-4. LINE VOLTAGE SELECT SWITCH AND LINE FUSE

The line voltage select switch (S2) is adjacent to the cardcage fan, and is shown schematically in figure 4-2. The switch has two positions, corresponding to the two usable line voltages; 115 Vac and 230 Vac. A keyed switch locking plate secures the switch in one position. The switch can be set to the other position, only by loosening the two plate hold-down screws, and flipping the plate over. Each side of the plate is labeled.

Fuse F1 is located on the rear chassis panel, right side. A 4.0 ampere fuse should be used for 230 volt operation and a 7.0 ampere fuse is used for 115 volt operation.

The line filter is located directly below the fuse. The line filter hardware also functions as the power cord connector.

3-5. FANS

The chassis utilizes two fans for cooling purposes. Both are located on the power ON/OFF switch side of the chassis. Air flow is directed into the chassis, with one fan cooling the power supply and the other cooling the cardcage. Power for each fan is derived directly from the line voltage select switch.

3-6. iSBC 604/614 CARDCAGE AND BACKPLANE

Each cardcage houses a total of four iSBC boards. Considered part of the cardcage, the backplane is a printed circuit board with Multibus and other connectors attached. Operating voltages reach the boards via the backplane and all interboard communication occurs on the Multibus lines.

Signal terminator resistors are located on the iSBC 604 backplane circuit board, and are shown schematically in figure 4-7.

3-7. iSBC 640 POWER SUPPLY

This power supply provides regulated DC voltages (+12, -12, +5, & -5) from 100, 115, 215 or 230 Vac power sources. Output levels are delivered through keyed connectors which mate directly to the front panel and backplane. All outputs have current limiting and overvoltage protection. These tolerances are listed in the Specifications section of the *iSBC 640 Hardware Reference Manual.*

3-8. POWER-FAIL STATUS. The power supply is equipped with an AC line monitor which will generate the ACLO signal, when the source falls below 90% of its nominal value. This signal is

typically connected to an interrupt matrix or controller on the Single Board Computer. For complete details on the ACLO signal, and its use, refer to the *iSBC 640 Hardware Reference Manual.*

3-9. OUTPUT VOLTAGE ADJUSTMENTS.

Each output voltage level is individually adjustable. Procedures for these adjustments are given in the *iSBC 640 Hardware Reference Manual.*

CHAPTER 4
SERVICE INFORMATION

4-1. INTRODUCTION

This chapter provides service and repair assistance instructions, removal and replacement information, and service diagrams.

4-2. SERVICE AND REPAIR ASSISTANCE

United States customers can obtain service and repair assistance by contacting the Intel Product Service Hotline in Phoenix, Arizona. Customers outside the United States should contact their sales source (Intel Sales Office or Authorized Distributor) for service information and repair assistance.

Before calling the Product Service Hotline, you should have the following information available:

a. Date you received the product.

b. Complete part number of the product (including dash number). On boards, this number is usually silk-screened onto the board. On other MCSD products, it is usually stamped on a label.

c. Serial number of product. On boards, this number is usually stamped on the board. On other MCSD products, the serial number is usually stamped on a label.

d. Shipping and billing addresses.

e. If your Intel product warranty has expired, you must provide a purchase order number for billing purposes.

f. If you have an extended warranty agreement, be sure to advise the Hotline personnel of this agreement.

Use the following numbers for contacting the Intel Product Service Hotline:

Telephone

All U.S. locations,
Except Alaska, Arizona, & Hawaii:

(800) 528-0595

All other locations: (602) 869-4600

TWX Number

910 - 951 - 1330

Always contact the Product Service Hotline before returning a product to Intel for repair. You will be given a repair authorization number, shipping instructions, and other important information which will help Intel provide you with fast, efficient service. If you are returning the product because of damage sustained during shipment or if the product is out of warranty, a purchase order is required before Intel can initiate the repair.

In preparing the product for shipment to the Repair Center, use the original factory packing material, if possible. If this material is not available, wrap the product in a cushioning material such as Air Cap TH-240, manufactured by the Sealed Air Corporation, Hawthorne, N.J. Then enclose in a heavy duty corrugated shipping carton, and label "FRAGILE" to ensure careful handling. Ship only to the address specified by Product Service Hotline personnel.

4-3. REMOVAL AND REPLACEMENT

The removal and replacement of most components in the iSBC 660 System Chassis is obvious. Only those procedures that are critical or are not considered obvious will be discussed in this section.

4-4. POWER SUPPLY REMOVAL

The power supply can be partially removed from the chassis for access to the backplane. With partial removal, the cables are not disconnected and the power supply is still operational.

CAUTION

Do not operate the iSBC 660 System Chassis under load with the power supply partially removed any longer than 15 minutes for installation or maintenance. The power supply can overheat if under load and is not cooled by the internal fans.

For *partial* removal of the power supply proceed as follows:

a. Set POWER switch to OFF and disconnect ac power cord from its receptacle.

b. Pull front panel cover off. The cover is secured by snaps. (See figure 1-1). Remove rack screws.

c. Pull chassis fully out on sides.

d. Remove top cover.

e. Unplug J1 cable from left end of front panel printed circuit board. (See figure 4-3.)

f. Remove four screws which support the front panel, and set front panel aside.

g. Be sure the main chassis is level and remove the four power supply retaining screws, located under the chassis.

h. Push chassis back into rack. Secure with one rack screw on each side.

i. Pull power supply out of chassis through front panel access, until the two large posts on lower rear corners of power supply contact the brackets in lower corners of front panel cutout. These posts will support power supply so it can hang below front panel.

For *complete* removal of the power supply, proceed as follows:

a. Perform steps (a) through (g) above.

b. Disconnect and tag power supply cables.

c. Lift power supply out through top of chassis.

4-5. CARDCAGE/BACKPLANE REMOVAL

To remove the cardcage/backplane, proceed as follows:

a. Disconnect AC power cord.

b. Remove top cover and the four screws that secure the lower cardcage to bottom panel.

c. Move cardcages away from power supply to gain access to the backplane connectors.

d. Desolder and tag the single wires on pins 14, 32, and 86 of the lower backplane.

e. Disconnect the four power connectors (P8U and L, P6U and L).

f. Lift cardcages out of chassis.

g. Reverse the steps for replacement.

4-6. INDICATOR LAMP REPLACEMENT

The POWER switch has an integral incandescent indicator lamp. To replace the lamp, proceed as follows:

a. Set POWER switch to OFF and remove front panel cover.

b. Pull rectangular switch cover assembly straight out from panel.

c. The indicator lamp is recessed in a sleeve in the cover assembly. Remove lamp and replace with a No. 387 lamp, size T1 3/4, 28V.

d. Replace switch cover and front panel cover.

4-7. SERVICE DIAGRAMS

The iSBC 660 Service Diagrams are given in figures 4-1 through 4-8. A signal mnemonic that ends with a slash denotes the signal is active low ($\leq$0.4V). Conversely, a signal mnemonic without a slash denotes the signal is active high ($\geq$2.4V).

4-8. REPLACEMENT PARTS LISTING

Table 4-1 lists the replacement parts for the iSBC 660 System Chassis. The table is grouped according to chassis modules. Abbreviations used in the parts listing are identified in table 4-2. Parts for the power supply are listed in the *iSBC 640 Power Supply Hardware Reference Manual.*

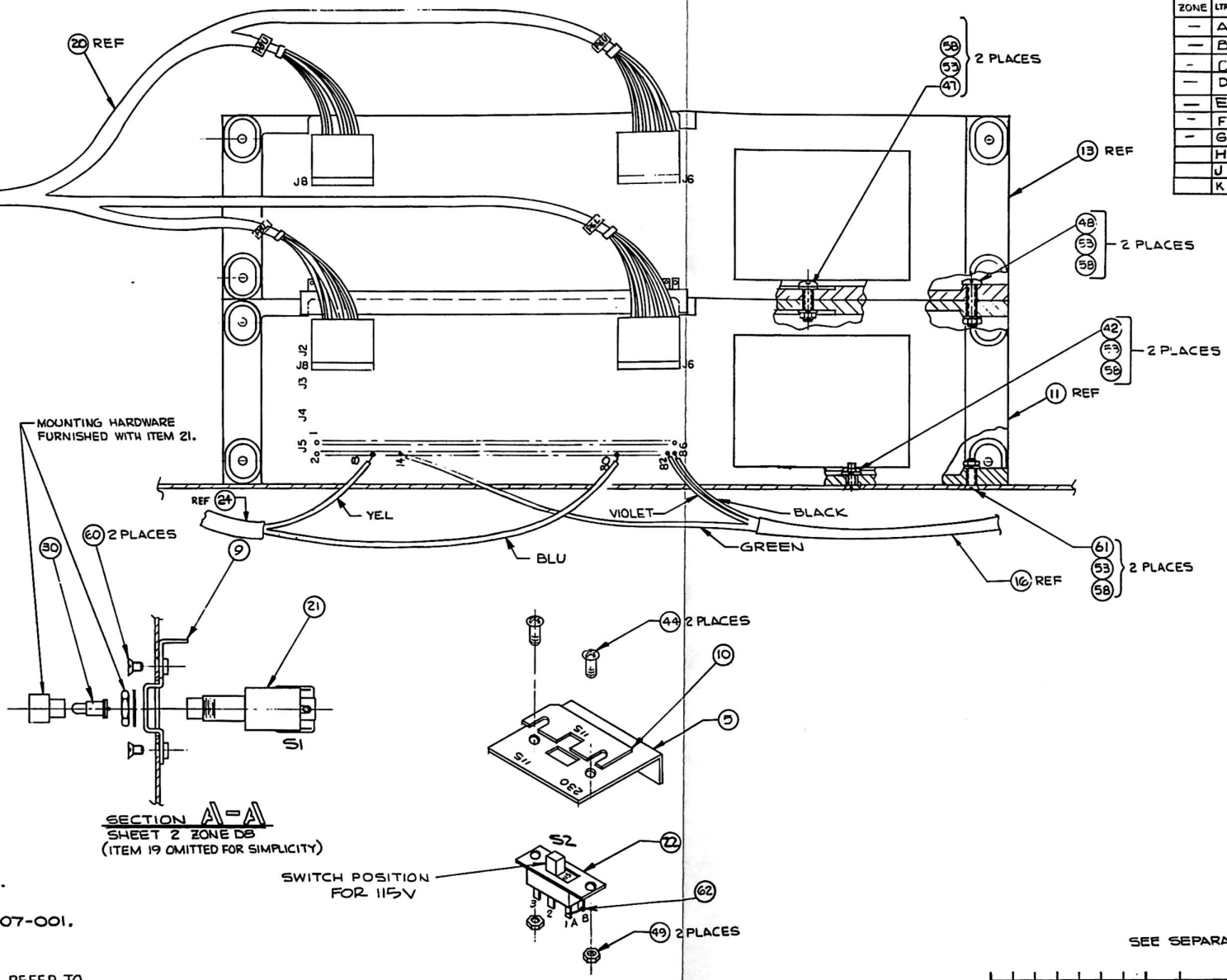
Table 4-1. Replacement Parts Listing

Figure & Index No.		Description	Part No.	Mfr. Code	Qty.
4-1		Main Frame Assembly	4001135D	Intel	1
	3	Chassis, tray	3000627-01	Intel	1
	4	Cover, top	3000628-01	Intel	1
	5	Bracket, switch	3000659-01	Intel	1
	6	Clamp, cable	3000661-01	Intel	3
	7	Panel, rear	3000663-01	Intel	1
	10	Plate, locking	300997-01	Intel	1
	11	Cardcage, iSBC 604	4000681-07	Intel	1
	13	Cardcage, iSBC 614	4000681-05	Intel	1
	14	Bracket	4000768-01	Intel	1
	15	Front panel subassembly (See figure 4-3)	4001094-01	Intel	1
	16	Front panel cable	4001151-01	Intel	1
	17	Harness, AC Power	4001390-01	Intel	1
	19	Power Supply	4503040-01	Intel	1
	21	Switch, DPDT, illuminated (S1)	572-8115-11	ILL	1
	22	Switch, DPDT, slide (S2)	46206LR	SWI	1
	25	Filter, line 10 Amp (LF1)	F1969	COR	1
	26	Fuse, 4 Amp 250V (F1)	OBD	CML	1
	29	Fuse holder	342048	LIT	1
	30	Lamp, miniature 28v, .04 Amp T 1.75 in.	387	GTE	1
	31	Fuse, 7 Amp 125V (F1)	OBD	CML	1
	32	Fan, 4.65 in. sq. (B1, B2)	MU2A1 028021	ROT	2
4-3	6	Subpanel Assembly	3000656-02	Intel	1
	7	Display Overlay	3000816-01	Intel	1
	8	Sub-panel Display	3001087-01	Intel	1
	12	Switch, DPDT, Momentary (S3)	7208J1ZBEX	C + K	1
4-4	1	Display Printed Circuit Board	1000788-01	Intel	1
	5	Nand gate 1C 7438 (A2)	SN7438	TI	1
	7	Resistor, 2.2K Ohm ±5%, .25 Watt (R3-R5)	OBD	CML	3
	9	Connector, header, 8-position	87528-1	AMP	1
	10	Terminal, mini turret	OBD	CML	5
4-6		Cardcage Assembly			
	1	Cardcage (no backplane)	3000636-02	Intel	1
	3	Cardcage clamp	3000638-02	Intel	2
	11	Backplane, expansion (iSBC 614)	1000646-05	Intel	1
	15	Backplane, termination (iSBC 604)	1000664-06	Intel	1

Table 4-2. Manufacturer's Codes

Mfr. Code	Manufacturer	Address	Mfr. Code	Manufacturer	Address
AMP	AMP, Inc.	Harrisburg, PA	LIT	Littlefuse Co.	Des Planes, IL
C + K	C + K Corporation	Watertown, MA	POI	Power One, Inc.	Camarillo, CA
COR	Cor-Com	Chicago, IL	ROT	Rotron, Inc.	Woodstock, NY
GTE	GTE Sylvania Mini Lamp	Hillsboro, NH	SWI	Switchcraft, Inc.	Chicago, IL
HOL	Hollingsworth, Inc.	Phoenixville, PA	TI	Texas Instruments	Dallas, TX
INTEL	Intel Corporation	Santa Clara, CA	CML	Any Commercial Source; Order By Description (OBD)	
ILL	Illuminated Products	Santa Ana, CA			

CHANGE ZONE	LTR	REVISIONS DESCRIPTION	SIGNATURE AND DATE DFT	CHK	ENGR
—	A	PRODUCTION RELEASE	STEEN 6/9/77	PG 6-21-77	6-25-77
—	B	SEE ECO # 01157	6/ /77	TSF 7-20-77	7-20-77
—	C	SEE ECO 01744	8/3-12	JC 8-1-78	8-3-78
—	D	SEE ECO NO. 2-1715-12	9/19/78	10-27-78 JC	GHS 11-20-78
—	E	SEE ECO 4-1083 A	3/29/79	4-10-79	4-10-79
—	F	SEE ECO 4-1411A	8-6-79	8-13-79	8-13-79
—	G	ECO 4-1556	5-2-80	5-14-80	5-14-80
	H	ECO 4-1591	8-13-80	10-22-80 JC	10-22-80
	J	ECO 40-1063	10-27-81	11-3-81 JC	11-3-81
	K	ECO 40-1071	12-5-81	12-14-81 JC	12-14-81



8. SEE WIRING DIAGRAM 142644.
7. REMOVED.
6. WORKMANSHIP PER 99-0007-001.
5. INSTALL ITEM 26 WITH TAPE TO REAR OF ITEM 7.
4. GND HARNESS AT THIS POINT REFER TO DRAWING NO. 4001390.
3. MARK VENDOR ID WITH CONTRASTING PERM COLOR, APPROX WHERE SHOWN.
2. MARK PART NO. AND REV. LEVEL WITH CONTRASTING PERM COLOR, APPROX. WHERE SHOWN.
1. ASSY PART NO. IS 4001135-06. PWA AND P/L ARE TRACKING DOCUMENTS.

NOTES: UNLESS OTHERWISE SPECIFIED

SEE SEPARATE PARTS LIST

ITEM NO.	PART NUMBER	DESCRIPTION
	PARTS LIST	

QUANTITY PER DASH NO.			
SCALE: 1/1			
TOL. ±	2 PLC	3 PLC	ANGLE
MATERIAL:			
FINISH:			
4001144	SBC660		
NEXT ASSY	USED ON		

SIGNATURE	DATE
DRN BY K.COHN	7/14
CHK BY	7/17
DFT APPD	7/7/77
ENGR APPD	9/7/77
AUTH BY	6/24/77
CODE:	SHEET 1 OF 2

intel 3065 BOWERS AVE. SANTA CLARA CALIF. 95051

TITLE: MAIN FRAME ASSY

SIZE	DEPT	DRAWING NO.	REV
D	OMS	4001135	K

Figure 4-1. Main Frame Assembly (Sheet 1 of 2)

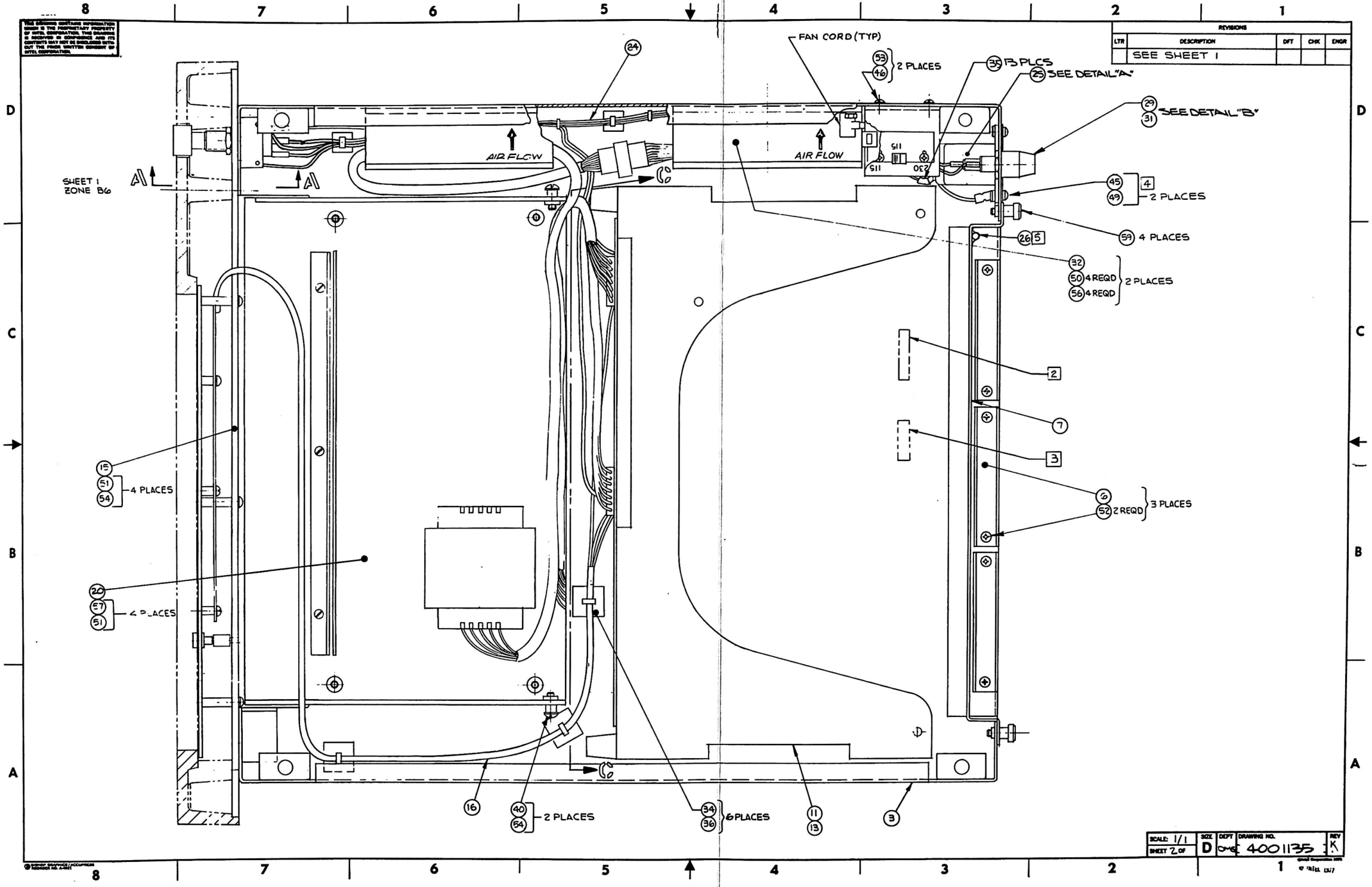


Figure 4-1. Main Frame Assembly (Sheet 2 of 2)

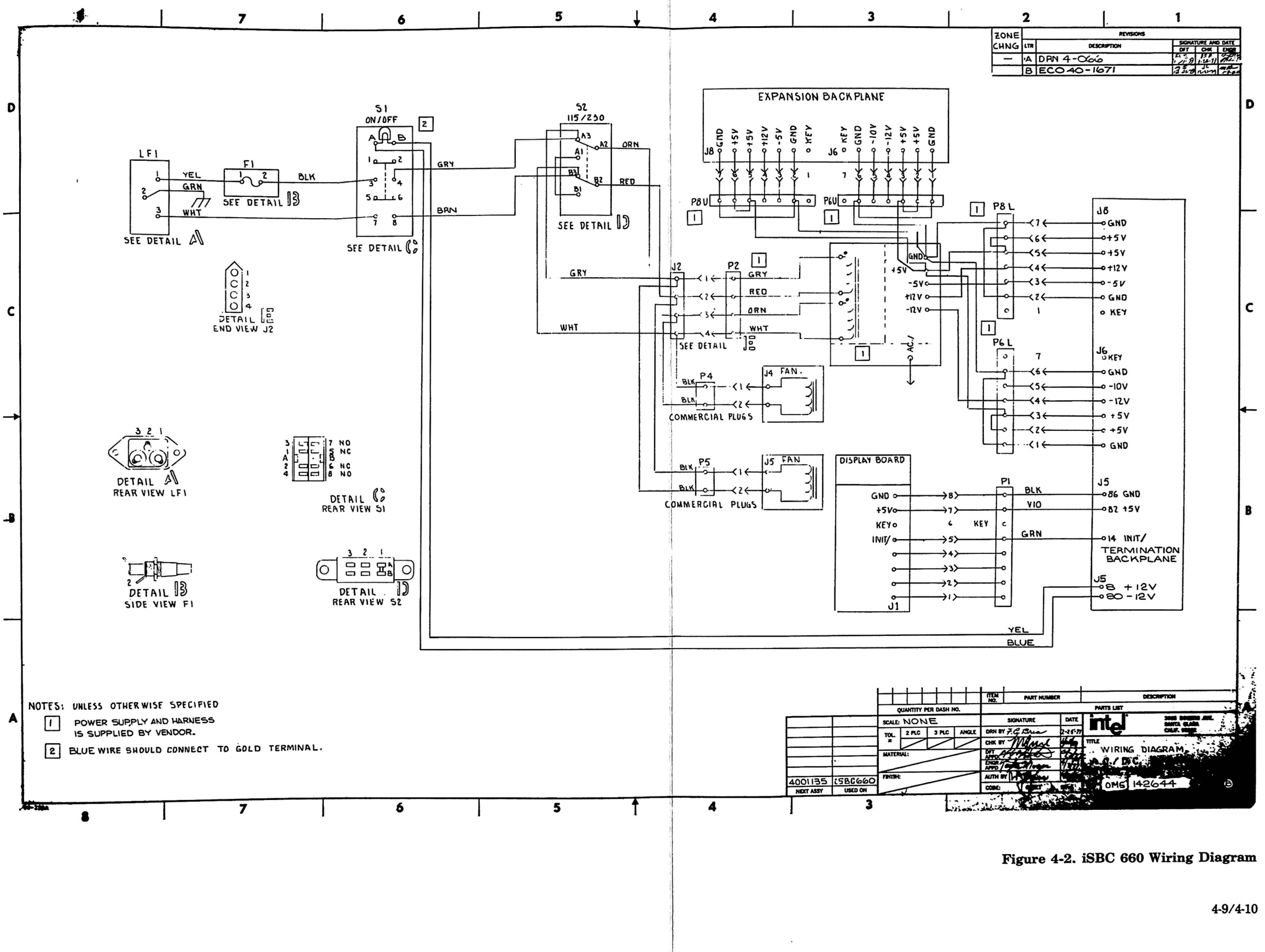
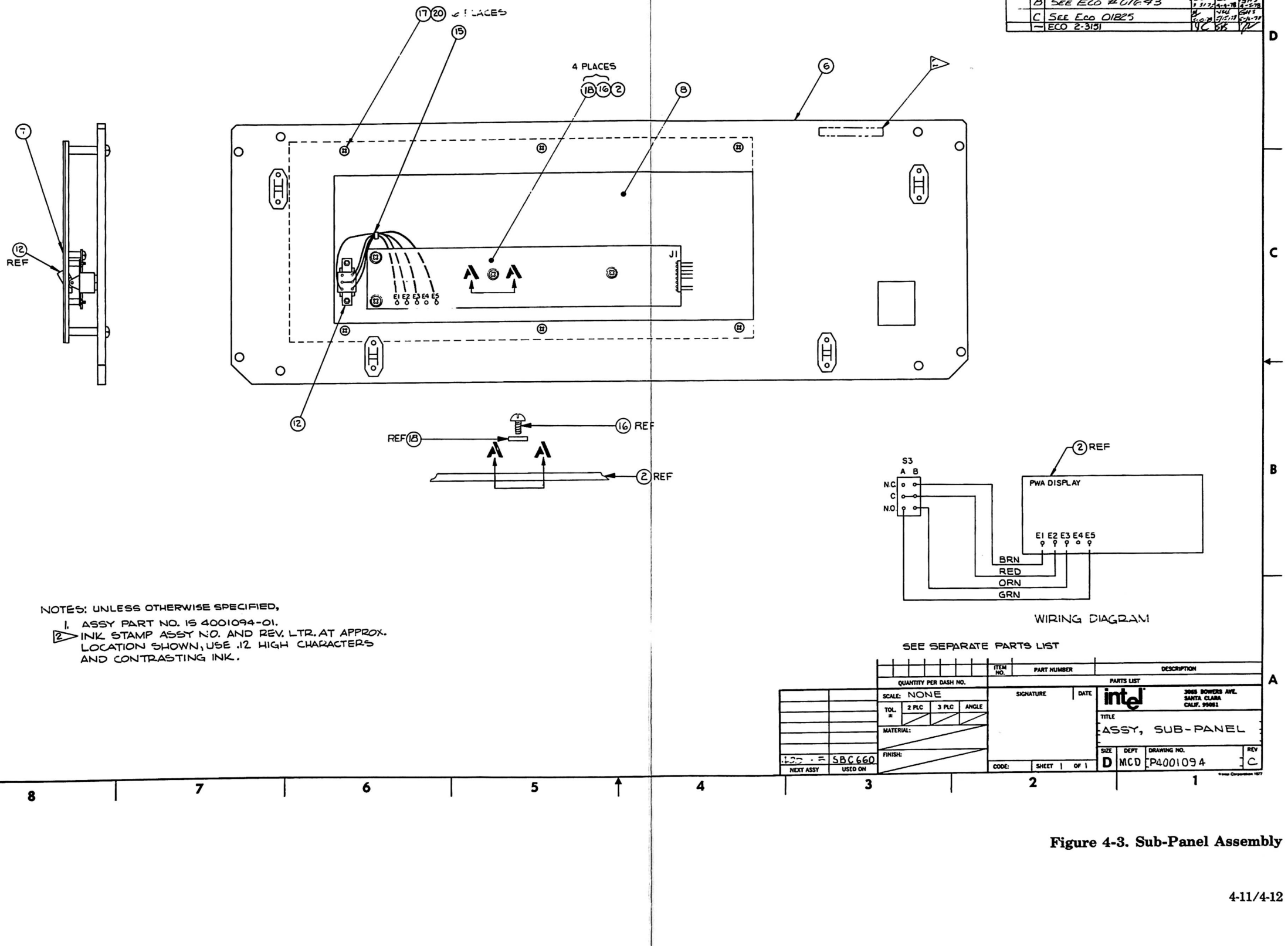


Figure 4-2. iSBC 660 Wiring Diagram

ZONE CHNG	LTR	REVISIONS DESCRIPTION	SIGNATURE AND DATE DFT	CHK	ENGR
—	A	PRODUCTION RELEASE	JETERM 1/5 1-18-77		1/31 2-23-77
	B	SEE ECO #01693	RSC 1 3 1 7	RD 4-4-78	GHS 4-5-78
	C	SEE ECO 01825	JL 5-10-78	VRC 5-15-78	GHS 5-16-78
	—	ECO 2-3151	VC	DR	



NOTES: UNLESS OTHERWISE SPECIFIED,

1. ASSY PART NO. IS 4001094-01.
2. INK STAMP ASSY NO. AND REV. LTR. AT APPROX. LOCATION SHOWN, USE .12 HIGH CHARACTERS AND CONTRASTING INK.

Figure 4-3. Sub-Panel Assembly

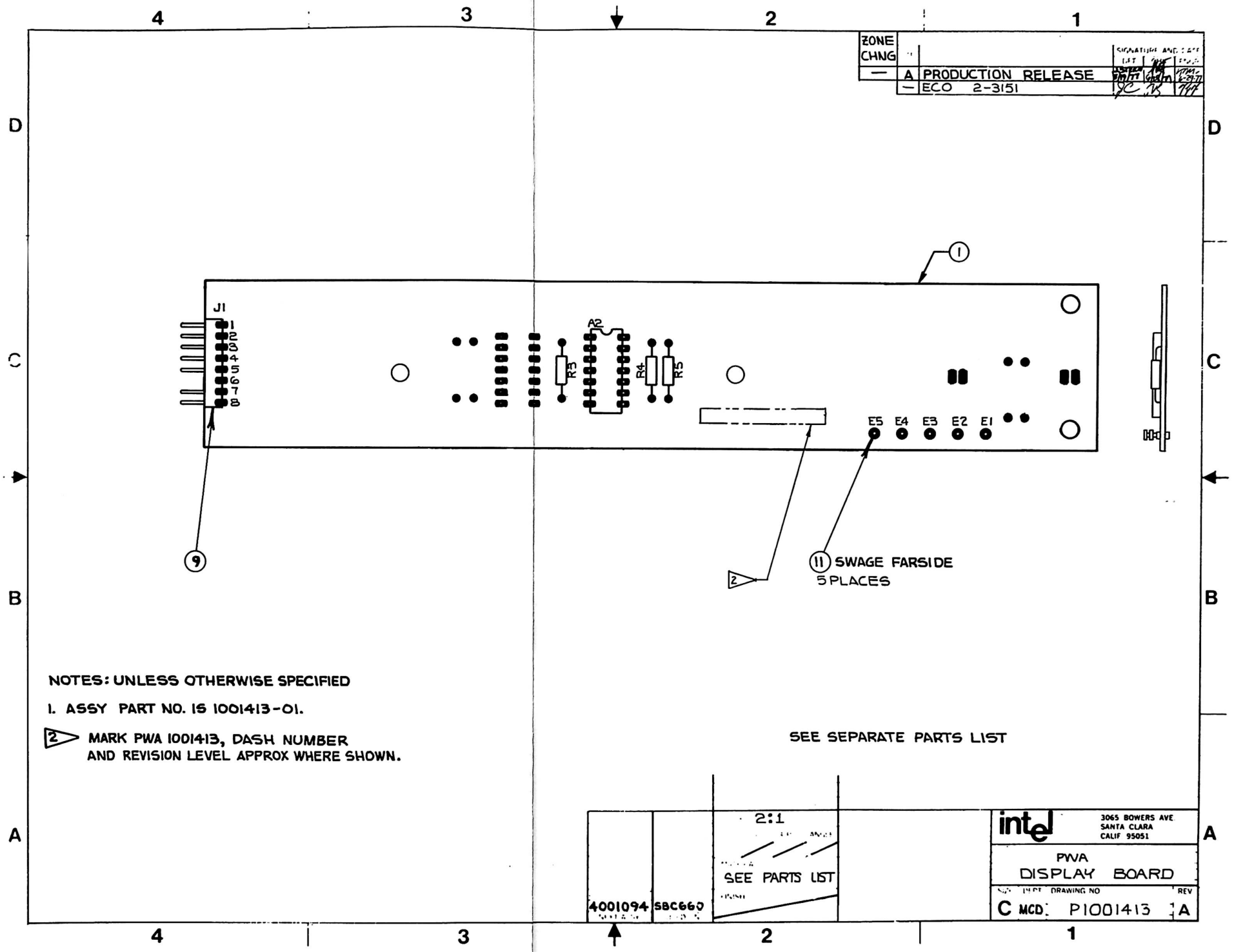


Figure 4-4. Display Board Assembly

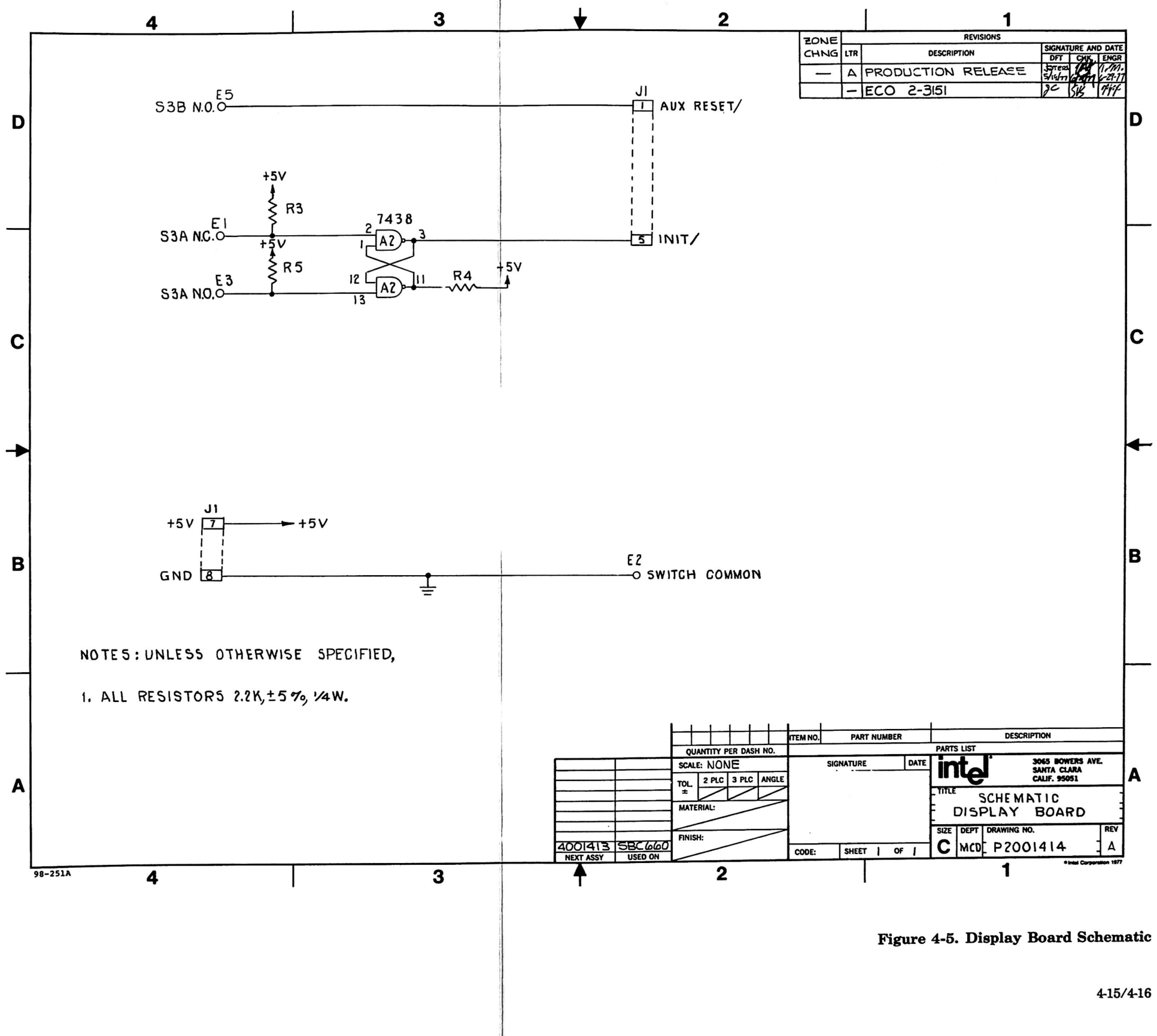


Figure 4-5. Display Board Schematic

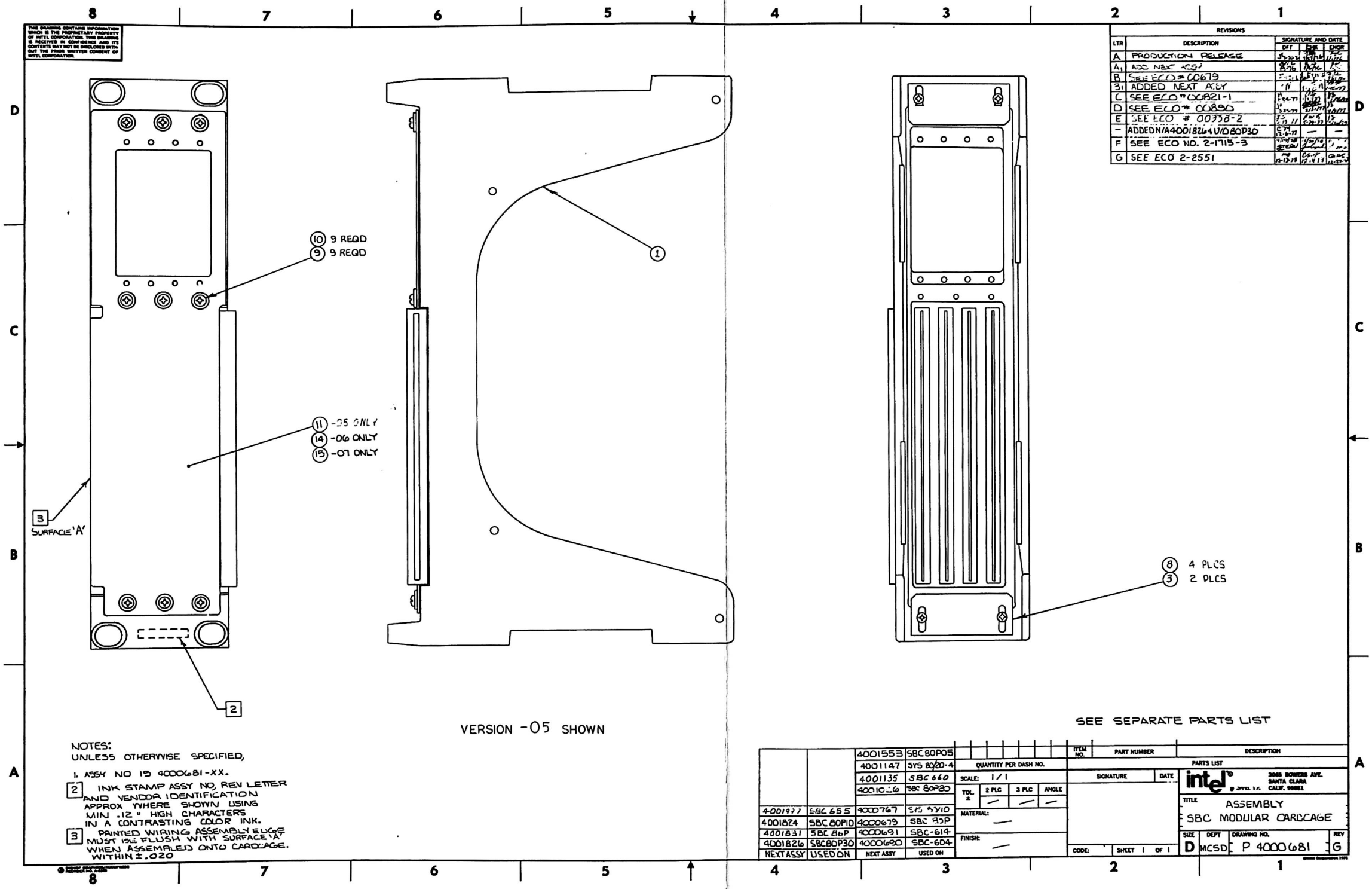


Figure 4-6. iSBC 604/614 Cardcage Assembly

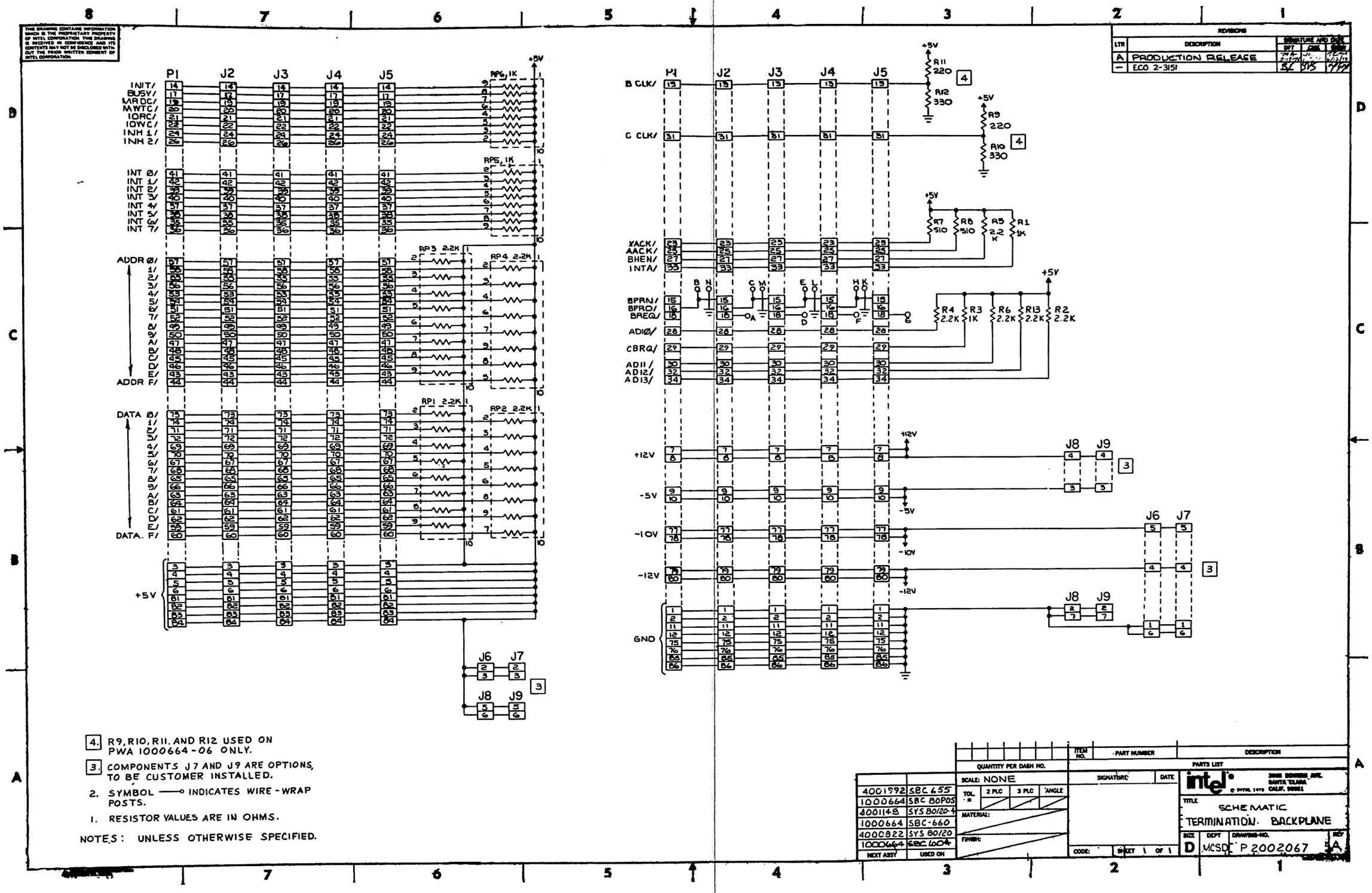


Figure 4-7. iSBC 604 Backplane Schematic

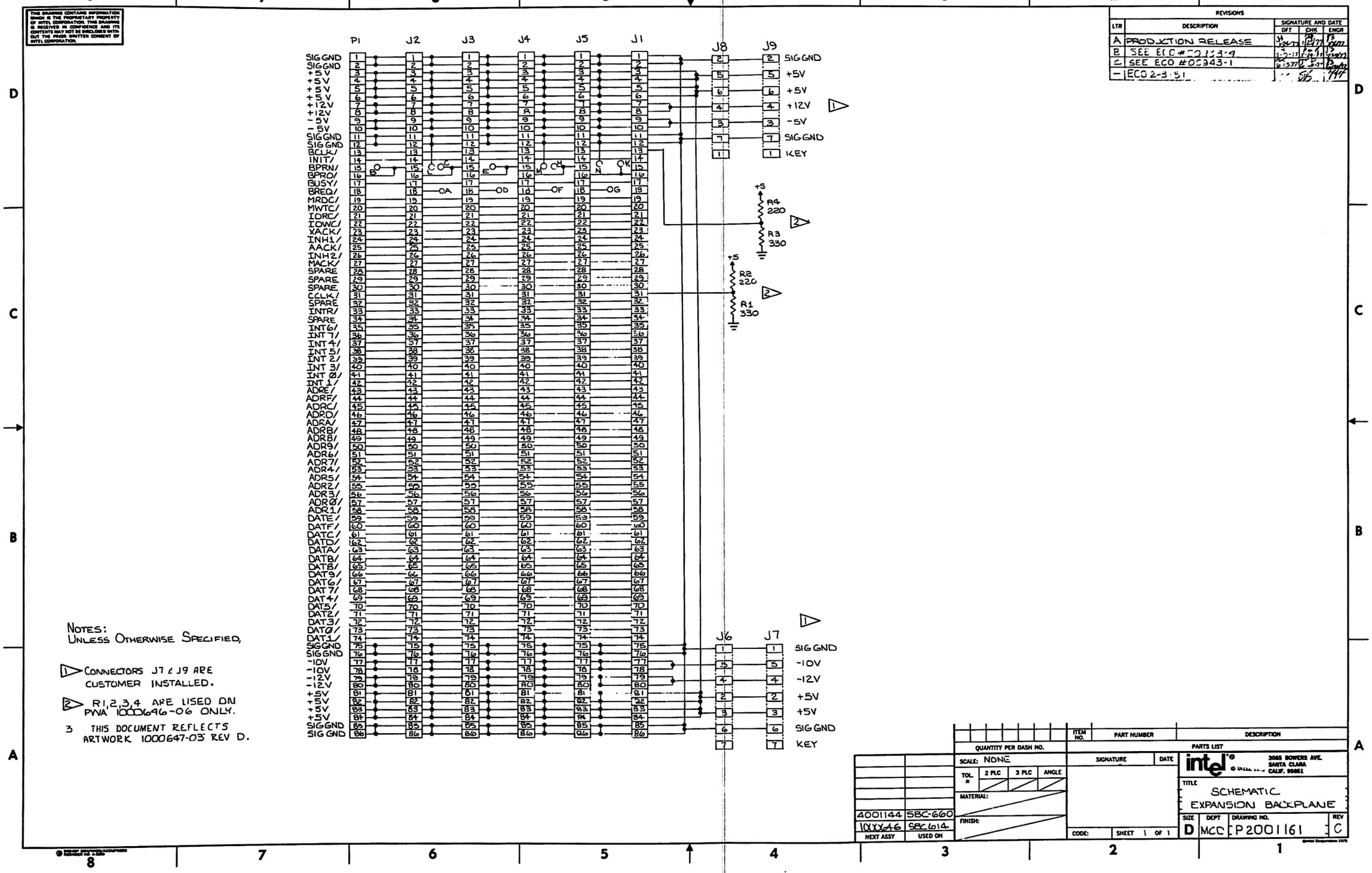


Figure 4-8. iSBC 614 Expansion Backplane Schematic

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